IMPACT: International Journal of Research in Engineering & Technology (IMPACT: IJRET)
ISSN(E): 2321-8843; ISSN(P): 2347-4599
Vol. 1, Issue 6, Nov 2013, 29-36

TOWARDS PROPOSING A NOVEL THEORETICAL TECHNIQUE FOR TRAFFIC MONITORING OVER FIXED MONITORS

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ABSTRACT

Monitoring the traffic encompasses traffic accounting, traffic shaping of network, operators employed in network, forensics involved and debugging. Most of the existing solutions only use better placement monitoring methods which are fixed in routing and routing traffic sub populations over existing monitors. This work proposes a novel technique for monitoring the network traffic flows. Traffic characteristics and measurement objectives are changing frequently. So, previous techniques for traffic monitoring become sub-optimal because of poor choice of monitors placement. To solve this problem we strategically routing traffic sub populations over fixed monitors. This approach is called measurouting. The main motive for MeasuRouting is effectively utilizing channel capacity or meeting quality-of-service constraints. It works within the constraints of existing intra domain traffic engineering operations. In this paper, we present a theoretical framework for MeasuRouting.

KEYWORDS: Intra Domain Traffic Engineering, Traffic Accounting, Forensics, Traffic Characteristics, Traffic Shaping of the Network

INTRODUCTION

Today communication plays a vital role in any impact. For communication main thing is the networks. It must be of less cost, high speed and must be secure. But major problem in today's network is it faces heavy network traffic and congestions. It also solves the major problem faced due to this traffic and cost effective. Actually we won't take care of size of data that we used to send to the receiver we just attach the document and send it to our receiver. But causes lot of problems in the network. It not only affects our side but also for other user who depends on that particular network.

Network traffic is often far from predictable. Usage trends come and go, performance bottlenecks can take place when you least expect it, and costs can therefore shoot up at the worst possible time. With the help of reliable network traffic monitoring software, however, you can spot problems before they occur. PRTG Network Monitor is an established, popular and affordable network traffic monitor that enables you to manage your network the way you want to. Supporting SNMP, Packet Sniffing and Net Flow, the bandwidth tool displays data in easy-to-read graphs and tables that can be exported as reports, or accessed via a browser wherever you are: analyzing and managing network traffic is easy with the PRTG network traffic monitors.

To measure the traffic that flows through the network, the existing techniques provide a function called traffic monitoring for all the interfaces of a network. In this, each interface monitors all the traffic that is passed through it. Monitoring all the traffic over all routers increases overhead for both the routers and the network. So, only some of the traffic will be sampled for each monitoring period. At each monitoring period, choose a certain subset of packets for sampling by all monitoring devices. Different subsets of packets are then monitored during different monitoring periods.

Choosing Better Availability of the Network and its Performance

To choose best possible availability of the network and its performance, it is important to monitor network troubleshooting. Network analysis automates the investigations of the root cause of performance issues. Accurate measurement of the network traffic is a major problem in network management tasks because of anomaly detection, network monitoring, accounting. A tool for measuring traffic is a hardware or software running on the routers. It collects the statistics of network traffic. These statistics are used to make the routing decisions i.e., re-routing traffic that is to be best monitored.

LITERATURE SURVEY

Significance and Analysis of the Network

Network administrators are interested to monitor and analyze the networks. For network administrators, monitoring a network is a difficult task. Network administrators are constantly struggling to maintain smooth operation of their networks. Even if the network slows down for a small period of time, essential services that provide the network would be compromised. Network administrators need to monitor the traffic flows and performance throughout the network and verify that there are no security threats occur in the network. Analysis of a network captures the network and determines what is happening on the network.

Existing System

In modern society, high-quality network traffic measurements are necessary to better understand the network and manage it. Previous work is on placement of monitors for fixed routing and routing traffic subpopulations over an existing monitor placement for increasing measurement gain of the network. For optimal placement of monitors it assumes previous knowledge about traffic characteristics. Both the traffic characteristics and the measurement objectives are changing frequently. So, the previous solution for measuring the traffic is suboptimal. The optimal monitor deployment for one measurement task might become suboptimal once the objective changes.

Proposed System

A novel technique was proposed to route the traffic dynamically over fixed monitors to achieve maximum measurement gain of the network. That technique is called measurouting. Measurouting was proposed recently to route important traffic dynamically over fixed monitors such that it could be best monitored. The main idea of measurouting is to separate important and unimportant flows and then exchange those routes for achieving better monitoring of measurement gain and load balancing. The placements of monitors have already been fixed and decided previously. It does not consider the flexibility of deploying new monitors and replacing old ones or altering the existing monitor placement strategies.

Methods for Maximising the Traffic Measurement Gain

In network-wide traffic monitoring, improving the traffic measurement gain is a hard problem. Several solutions have been proposed for improving the measurement gain of a traffic

- Best placement for monitors across the network
- Finding better placement of monitors and corresponding configuration decisions
- Sampling of network flows
- Decisions for routing traffic

- **Placement of Monitors:** Previous work on network-wide traffic monitoring is placing monitors in appropriate positions to cover all the paths over all routings. It uses as few monitors as possible.
- **Placement and Configuration Decisions for Traffic Monitoring:** Place the monitors in best locations for achieving maximum measurement gain. Configuration decisions of traffic monitoring include packet sampling rates. It considers the problem of where the monitoring devices are to be placed in the network and how to control their sampling rates.
- **Sampling of Network Flows:** Traffic monitoring devices cannot record all the flows of routing packets because of minimal resource requirements. So, only important flows are to be selected and sampled, which are dynamically routed through the monitoring equipment.
- **Decisions for Routing Traffic:** Previous research is focused on placement of monitors over fixed monitors to improve the measurement gain of traffic. It involves both the placement of monitors and configuration decisions for packet sampling rates. It assumes a previous knowledge about the traffic characteristics for optimal placement and configuration of monitoring devices. These traffic characteristics and measurement objectives changes frequently. So, the previous solution for network-wide traffic monitoring becomes suboptimal.

Here we propose a technique called measurouting to dynamically re-route traffic subpopulations over fixed monitors for improving traffic measurement gain of the network. Measurouting takes input as previous locations of traffic monitoring devices and decides hoe the network flows are to be monitored. At every router the decision for routing a packet is performed dynamically. To improve the overall monitoring utility of the network, measurouting can adjust routing decisions dynamically. Monitoring utility means weighted sum of the traffic over all flows.

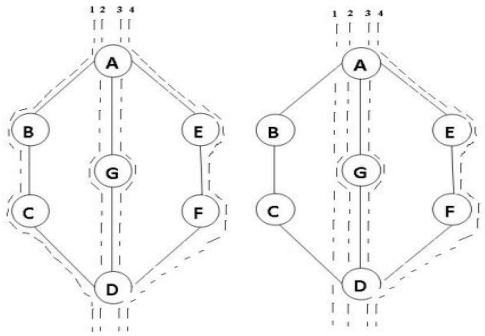
PERFORMANCE OF MEASUROUTING

MeasuRouting works within the intra-domain traffic engineering operations. It effectively utilizes channel capacity and meeting QOS constraints. The network operator chooses the location for placing monitors and provides best routing for important flows to achieve maximum measurement gain.

- Flow is represented using 5 tuple

  < srcip,dstip,srcpt,dstpt,proto>

Consider four traffic subpopulations f1,f2,f3 and f4. Router G has monitoring equipment and it is important for the network operator to monitor f1. Our TE policy is to minimize the maximum link utilization.



(a) (b)

Figure 1: (a) Represents Original Routing that Obeys TE Policy. (b) Violates TE Policy because F1 is Passed through Router G. Now there are 3 Flows from Router G, it Violates TE Policy. So, Reroute One of the Unimportant Flow to Router B

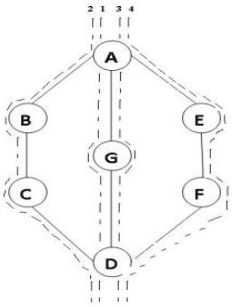


Figure 2: Is Complaint to the TE Policy

Definitions

A macro flow set is defined as set of flows when an aggregate placement of routing is given.

- If it is an intra domain traffic engineering routing, definition of macro flow set is defined as set of all flows between an OD pair.
- In MPLS networks, definition for macro flow set is defined as all flows between an ingress-egress pair of nodes which are on same QOS class.

Our requirement for measuRouting is all the flows in a macro flow set consist of same number of ingress and egress nodes. In this paper, consider a single macro flow set represents all flows between an OD pair. A macro-flow set contains multiple micro flow sets. There is a many-to-one relationship between micro-flow sets and macro-flow sets.

$\{S\}_{(i,j)\,\epsilon E}$ denotes the sampling characteristic of all links.

A simple metric called sampling characteristic for representing the ability of a link to sample the traffic.

$\{I\}_{y\epsilon\theta}$ denotes the sampling utility of the micro-flow sets.

This metric is used to define the importance of measuring a micro-flow set.

$\{S\}_{(i,j)\,\epsilon E}$ and $\{I\}_{y\epsilon\theta}$ are inputs to our problem.

Finally, we define the sampling resolution function(β)

$$\beta : \left(\{\gamma\}_{(i,j)\in E}^{y\in\theta}, \{\mathcal{S}\}_{(i,j)\in E}, \{\mathcal{I}\}_{y\in\theta} \right) \rightarrow \Re.$$

Experimental Results

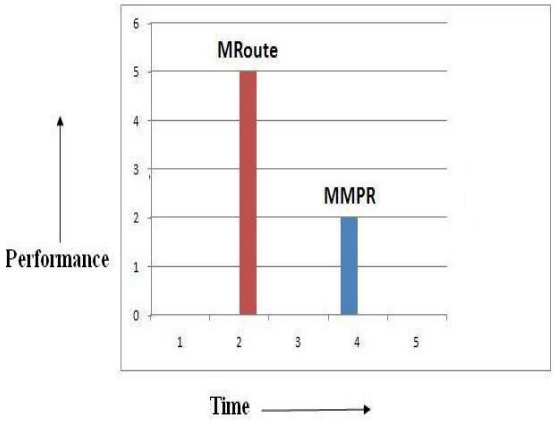


Figure 3

MeasuRouting Infrastructure

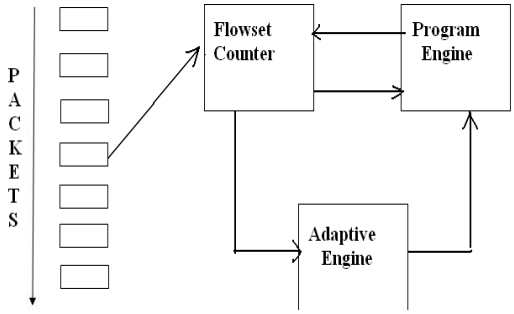


Figure 4

Traffic measurement is to count the number of packets (or bytes) that are routed over a particular period of time. When a flow is matched with a sampled packet then the counter value is incremented. The definition of flow set is defined as an arbitrary set of flows. It maintains one counter for every flow set.

Representation of flow include the 5-tuple of

{prt, sip, spt, dip, dpt}

prt is the protocol field, sip and dip are the source and destination IP address and spt and dpt are the source and destination port, respectively.

Adaptive engine and program engine are used to monitor the flowsets that are taken from flowset counter.

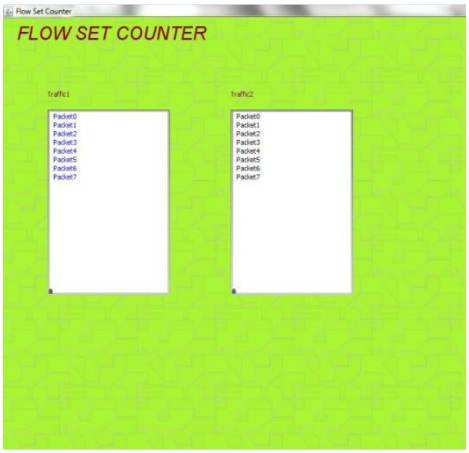


Figure 5

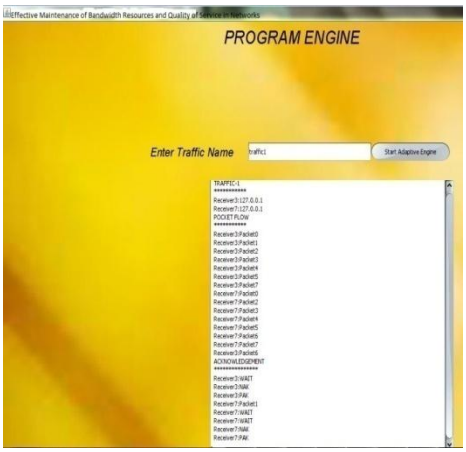


Figure 6

MEASUROUTING PROBLEMS

We define three classes of MeasuRouting problems, each differing in the level of required conformance to the original routing.

Least TE Disruption MeasuRouting (LTD)

The basic version of our MeasuRouting problem, referred to as LTD. LTD is the most flexible, but may result in routing loops or traffic between an OD pair traversing links it does not traverse in the original routing.

No Routing Loops MeasuRouting (NRL)

The flow conservation constraints in LTD do not guarantee the absence of loops. NRL disallows loops, but may result in routing semantics being violated. Loops are avoided by restricting the setoff links along which a micro-flow set can be routed.

Relaxed Sticky Routes MeasuRouting (RSR)

RSR ensures that the micro-flow set routing does not route macro flow set's traffic along a link that the macro-flow set's traffic was not routed along in the original routing.

CONCLUSIONS

We have implemented the measurouting successfully which deals with the flows through the dedicated monitors. This method has can assess the importance of traffic flows dynamically and can achieve traffic routing in a manner that is least disruptive to normal network performance while maximizing the measurement utility. Further this paper can be extended to handle more dynamically without congestion by adding a cellular automata based classifier at the starting of the network.

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